

STATE OF HAWAII

TITLE 12 DEPARTMENT OF LABOR AND INDUSTRIAL RELATIONS

SUBTITLE 8 DIVISION OF OCCUPATIONAL SAFETY AND HEALTH

CHAPTER 221

EXISTING AND NEW BOILERS AND PRESSURE VESSELS

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Historical Note: Chapter 221 of title 12 is based on chapter 377 of the Hawaii Occupational Safety and Health Standards, Rules and Regulations. [Eff. 7/11/74; am 12/30/76; am 8/22/77; am 8/1/78; R 12/6/82]

§12-221-1 Inspection of boilers and pressure vessels. All boilers and pressure vessels not exempted by the law or by rules promulgated under the law, and which are subject to regular inspections, shall be prepared for these inspections as required by the inspector. [Eff. 12/6/82; comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-221-2 Boilers and pressure vessels improperly prepared for inspection. If a boiler or pressure vessel has not been properly prepared for an internal inspection, or if the owner or user fails to comply with the requirements for a pressure test as set forth in

these rules, the inspector may decline to make the inspection or test; and the operating permit shall be withheld or right to operate revoked, until the owner or user complies with

the requirements. [Eff. 12/6/82; comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-221-3 Lap-seam crack. The shell or drum of a boiler or pressure vessel, in which a lap-seam crack is discovered along a longitudinal riveted joint, shall be immediately discontinued from use. Repair is prohibited. [Eff. 12/6/82; comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-221-4 Pressure tests. (a) A hydrostatic pressure test, when applied to boilers or pressure vessels, shall not exceed 1-1/2 times the maximum allowable working pressure, except that boilers of locomotives shall be tested to 1-1/4 times the maximum allowable working pressure. The pressure shall be under proper control so that in no case shall the required test pressure be exceeded by more than 6 per cent.

(b) During a hydrostatic test, the safety valve or valves shall be removed or each valve disk shall be held to its seat by means of a testing clamp and not by screwing down the compression screw upon the spring. A plug device designed for this purpose may be used.

(c) The minimum temperature of the water used to apply a hydrostatic test shall not be less than 70° F (21.1° C), and the maximum temperature during inspection shall not exceed 120° F (48.8° C).

(d) When a hydrostatic test is applied to determine tightness, the pressure shall be equal to the normal operating pressure but need not exceed the release pressure of the safety valve having the lowest release setting.

(e) When the contents of the vessel prohibit contamination by any other medium or when a hydrostatic test is not possible, other testing media may be used providing the precautionary requirements of the applicable section of the ASME code are followed. In these cases, there shall be agreement between the owner and the inspector. [Eff. 12/6/82; am 12/19/83; am 12/8/86; am and comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-221-5 Safety-valve minimum capacity requirements. The total minimum safety valve capacity in pounds per hour shall be determined on the basis of the pounds of steam generated per hour per square foot of boiler heating surface as given in table 221-1.

TABLE 221-1

**MINIMUM POUNDS OF STEAM PER HOUR
PER SQUARE FOOT OF HEATING SURFACE**

	Firetube Boilers	Watertube Boilers
Boiler heating surface:		
Hand fired	5	6
Stoker fired	7	8
Oil, gas, or pulverized fuel fired	8	10
Waterwall heating surface:		
Hand fired	8	8
Stoker fired	10	12
Oil, gas, or pulverized fuel fired	14	16

Notes:

1. When a boiler is fired only by a gas giving a heat value not in excess of 200 Btu per cubic feet, the minimum safety valve or safety-relief valve relieving capacity may be based on the value given for hand-fired boilers above.
2. The minimum safety valve or safety-relief valve relieving capacity for electric boilers shall be 3-1/2 pounds per hour per kilowatt input. [Eff. 12/6/82; comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-221-6 Safety valve stamping requirements. The marking on safety valves and safety-relief valves shall be as follows:

- (1) Safety valves for power boilers and fired pressure vessels shall be stamped with "V" symbol within the cloverleaf and letters "NB";
- (2) Hot water safety relief valves shall be stamped with "HV" symbol within the cloverleaf and letters "NB";
- (3) Safety valves for low-pressure steam heating boilers shall be stamped with the "HV" or "V" within the cloverleaf and letters "NB"; and
- (4) Safety valves and safety-relief valves for pressure vessels shall be stamped with the "UV" symbol within the cloverleaf and letters "NB". [Eff. 12/6/82; am 12/8/86;

§12-221-7 Pressure reducing valves. (a) Where pressure reducing valves are used, one or more safety or safety-relief valves shall be provided on the low-pressure side of the reducing valve when the piping or equipment on the low-pressure side does not meet the requirements for the full initial pressure. The safety or safety-relief valves shall be located adjoining or as close as possible to the reducing valve. Proper protection shall be provided to prevent injury or damage caused by the escaping fluid from the discharge of safety or safety-relief valves if vented to the atmosphere. The combined discharge capacity of the safety or safety-relief valves shall be such that the pressure rating of the lower pressure piping or equipment shall not be exceeded in case the reducing valve fails in the open position.

(b) The use of hand-controlled bypasses around reducing valves is permissible. If a bypass is used around the reducing valve, the safety valve required on the low-pressure side shall have sufficient capacity to relieve all the fluid that can pass through the bypass without overpressuring the low-pressure side.

(c) A pressure gage shall be installed on the low-pressure side of a reducing valve. [Eff. 12/6/82; comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-221-8 Boiler-blowoff equipment. (a) The blowdown from a boiler or boilers that enters a sanitary sewer system or blowdown which is considered a hazard to life or property shall pass through some form of blowoff equipment that will reduce pressure and temperature so that:

- (1) The temperature of the water leaving the blowoff equipment shall not exceed 150° F; and
- (2) The pressure of the blowdown leaving any type of blowoff equipment shall not exceed 5 psig.

(b) Blowoff equipment shall conform to the provisions set forth in the recommended rules for National Board Boiler Blowoff Equipment. [Eff. 12/6/82; comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-221-9 Location of discharge piping outlets. The discharge of safety valves, blowoff pipes, and other outlets shall be located and supported so as to prevent injury to personnel. [Eff. 12/6/82; comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-221-10 Supports. Each boiler and pressure vessel shall be supported by masonry or structural supports of sufficient strength and rigidity to safely support the boiler or pressure vessel and its contents. There shall be no excessive vibration in either the boiler, pressure vessel, or connecting piping. [Eff. 12/6/82;

comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-221-11 Clearances. For boilers and pressure vessels installed prior to July 1986, a recommended clearance of 3 feet between the top of the boiler proper and the ceiling and 3 feet between all sides of the boiler and adjacent walls or other structures should be provided. For all equipment installed after July 1986, refer to applicable sections for specific type of equipment. Boilers and pressure vessels having manholes shall have 5 feet clearance from the manhole opening and any wall, ceiling, or piping that will prevent a person from entering. All boilers and pressure vessels shall be so located that adequate space will be provided for the proper operation of the boilers and pressure vessels and their appurtenances, for the inspection of all surfaces, tubes, waterwalls, economizers, piping, valves, and other equipment for their necessary maintenance, repair, and replacement of tubes. [Eff. 12/6/82; am 12/8/86; comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-221-12 Exits from boiler room. (a) Each boiler room containing one or more boilers with a total of 500 square feet of heating surface or more shall be provided with two exits. These exits shall be remotely located from each other and have doors that open outward. Each elevation in this boiler room shall have two means of exit, each remotely located from the other.

(b) All exits from the boiler room shall be made safe and convenient and kept free and clear at all times. [Eff. 12/6/82; am 12/19/83; am 12/8/86; am and comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-221-13 Combustion air and ventilation requirements.

(a) A permanent source of outside air shall be provided for each boiler room to permit satisfactory combustion of the fuel and proper ventilation under normal operating conditions.

(b) The total requirements of the burners for all fired pressure vessel in the boiler room must be used to determine the louver sizes whether fired by coal, oil, or gas. However, the minimum net free louvered area shall not be less than 1 square foot. The following table or formula shall be used to determine the net louvered area in square feet.

(c) When mechanical ventilation is used in lieu of subsection (b) above, the supply of combustion and ventilation air to the boiler room and the firing device shall be interlocked with the fan so the firing device will not operate with the fan off. The velocity of the air through the ventilating fan shall not exceed 500 feet per minute, and the total air delivered shall be equal to or greater than shown in table 221-2.

TABLE 221-2

INPUT BTU/HOUR	REQUIRED AIR CU/FT/MIN	MIN NET LOUVERED AREA SQ FT
500,000	125	1.0
1,000,000	250	1.0
2,000,000	500	1.6
3,000,000	750	2.5
4,000,000	1,000	3.3
5,000,000	1,250	4.1
6,000,000	1,500	5.0
7,000,000	1,750	5.9
8,000,000	2,000	6.6
9,000,000	2,250	7.5
10,000,000	2,500	8.3

(BTUH / 10,000) x 2.5 = CFM

[Eff. 12/6/82; am 12/8/86; comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-221-14 Gas burners. For installations which are gas-fired, the burners used shall conform to the applicable requirements of the American Gas Association or the National Fire Protection Association, or equivalent. [Eff. 12/6/82; comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-221-15 Suggestions for operation. It is suggested that the Recommended Rules for Care of Power Boilers, Section VII, and the Recommended Rules for Care of Heating Boilers, Section VI, of the ASME Code be used as a guide for proper and safe operating practices. [Eff. 12/6/82; comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-221-16 Use of time clocks prohibited. The use of time clocks or other devices for automatically starting up or shutting down a power boiler or a heating boiler which produces steam shall be prohibited. [Eff. 12/6/82; comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-221-17 Welding. (a) All welding performed on boilers, pressure vessels, or piping covered by this chapter shall be performed in accordance with the applicable sections of the ASME Boiler and Pressure Vessel Code and ANSI/ASME B31.1f.

(b) Each employer or self-employed welder shall record in detail and shall qualify the procedure specifications for any welding procedures. All welding performed in qualifying a welding procedure shall be done in accordance with the procedure qualification.

(c) Each welder and welding operator who welds on vessels or piping covered by this chapter shall pass a test described in the applicable code for performance qualification. The essential variables and test results obtained by each welder and welder operator shall be recorded in the performance specification. Each employer or self-employed welder shall maintain a record of procedures, including the essential variables, under which welders and welder operators are examined, and the results of the examination.

(d) Forms for recording the necessary information for welding procedure specifications (WPS, QW-200.1), procedure qualification records (PQR, QW-200.2), and welder performance qualifications (WPQ, QW-301) shall be those suggested in the applicable codes noted in subsection (a) or other types approved by the department. These records shall be certified by the employers of contracted welders and shall be accessible to the authorized inspectors. [Eff. 12/6/82; am 12/8/86; am and comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-221-18 Ratings for valves, piping, and appurtenances. Each valve, pipe, and appurtenance shall be capable of withstanding the maximum working pressure and temperature of the boiler or pressure vessel on which it is installed. [Eff. 12/19/83; comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)